



Fact Sheet
Calendar Year 2014
Biosolids Land Application Program
Moccasin Bend WWTP
NPDES Permit No. TN 0024210
City of Chattanooga, Tennessee



General

The information contained in this fact sheet is based on information submitted to the EPA and state regulatory agencies as part of the 40 CFR Part 503 Annual Sludge Report for 2014. (40 CFR Part 503.18)

Quantities Produced and Land Applied

Annual Quantities

- 71,948 Wet Tons/year
- 26,483 Dry Tons/year
- 24,025 Dry Metric Tons/year

Monthly Quantities

<u>Month</u>	<u>Wet Tons</u>	<u>Dry Tons</u>	<u>Dry Metric Tons</u>
• January	2,960	1,065	967
• February	5,142	1,837	1,667
• March	7,047	2,505	2,272
• April	9,564	3,398	3,083
• May	8,996	3,196	2,899
• June	3,904	1,514	1,374
• July	9,635	3,801	3,448
• August	6,713	2,398	2,175
• September	7,987	2,971	2,695
• October	2,326	806	731
• November	3,808	1,487	1,349
• December	3,866	1,505	1,365

Quantities Land Applied by State

<u>State</u>	<u>Wet Tons</u>	<u>Dry Tons</u>	<u>Dry Metric Tons</u>
• TN	71,948	26,483	24,025

Quantities Land Applied by County

	<u>State</u>	<u>County</u>	<u>Wet Tons</u>	<u>Dry Tons</u>	<u>Dry Metric Tons</u>
•	TN	Bledsoe	37,309	13,482	12,231
•	TN	Grundy	12,782	4,758	4,316
•	TN	Hamilton	10,555	3,911	3,548
•	TN	Marion	2,633	1,031	935
•	TN	Meigs	965	384	349
•	TN	Rhea	6,795	2,562	2,324
•	TN	Sequatchie	908	355	322

Land Application Area

Total Acres Land Applied - By State

	<u>State</u>	<u>Acres</u>	<u>Hectares</u>
•	TN	6,307	2,552

Number of Farms and Total Acres Land Applied - By County

	<u>State</u>	<u>County</u>	<u>Acres</u>	<u>Hectares</u>	<u>Farms</u>
•	TN	Bledsoe	2,825	1,143	96
•	TN	Grundy	1,123	455	31
•	TN	Hamilton	1,085	439	47
•	TN	Marion	508	206	8
•	TN	Meigs	104	42	6
•	TN	Rhea	580	235	31
•	TN	Sequatchie	82	33	2

Total Historic Land Application Acreage - By State

	<u>State</u>	<u>Acres</u>	<u>Hectares</u>
•	AL	7,641	3,092
•	TN	28,665	11,600

Total Historic Land Application Acreage - By County

	<u>State</u>	<u>County</u>	<u>Acres</u>	<u>Hectares</u>
•	AL	Blount	1,079	436
•	AL	Cherokee	40	16
•	AL	DeKalb	1,888	764
•	AL	Etowah	170	69
•	AL	Jackson	2,210	894
•	AL	Madison	100	40
•	AL	Marshall	2,155	872
•	TN	Bledsoe	9,369	3,792
•	TN	Grundy	2,035	823
•	TN	Hamilton	3,498	1,415
•	TN	Marion	5,415	2,191
•	TN	Meigs	1,024	414
•	TN	Rhea	2,849	1,153
•	TN	Sequatchie	3,860	1,562
•	TN	Van Buren	616	249

Nutrient or Fertilizer Content

Data are averaged over 98 sampling events in 2014.

N-P-K and Lime (Ca) Content (% Dry-Wt Basis)

- Total Nitrogen (N) 3.9%
- Organic Nitrogen (N) 3.8%
- Ammonia Nitrogen (N) 0.1%
- Phosphorous (P) 8.0%
- Potassium (K) 0.2%
- Calcium (Ca) 12.1%
- Calcium (CaO equiv.) 3.7%

Other Nutrient Content (% Dry-Wt Basis)

- Iron (Fe) 2.0%
- Boron (B) 0.0%
- Sulfur (S) 0.6%

Total Solids & pH

- Total Solids 44.08%
- pH (std. units) 10.85

Potential Value of Nutrients in Biosolids

Value of Commercial Nutrients

- Nitrogen (N) \$1,280 /Ton, 100-0-0
- Phosphorous as phosphate (P2O5) \$868 /Ton, 0-100-0
- Potassium as potassium oxide (K2O) \$1,019 /Ton, 0-0-100
- Ag Lime as calcium carbonate (CaCO3) \$37 /Ton, CCE=100

Prices are scaled up as needed to represent the cost of "pure" nutrients: 100-0-0, 0-100-0, 0-0-100, and CCE=100, respectively.

Values are based on regional ag-coop prices, adjusted to include hauling and spreading costs for a typical corn grain crop.

Value of Nutrients in Biosolids

- Ammonia Nitrogen (NH4 as N) \$1.65 /Dry Ton
- Organic Nitrogen (as N) \$21.92 /Dry Ton
- Phosphorous as phosphate (P2O5) \$159.62 /Dry Ton
- Potassium as potassium oxide (K2O) \$3.79 /Dry Ton
- Ag Lime as calcium carbonate (CaCO3) \$2.45 /Dry Ton
- Total: \$189.43 /Dry Ton

The current year's and the next two years' mineralization of Organic Nitrogen is used in determining its immediate value. In the first three years, only 45.3% of the Organic Nitrogen is plant available, and only that portion is being assigned monetary value in this calculation. The remaining portion, as well as the other tangible benefits of adding organics to soils, is not included.

Total Annual Value of Nutrients in Biosolids Provided to Farmers

- Nitrogen (NH4 and available OrgN as N) \$624,000
- Phosphorous as phosphate (P2O5) \$4,227,000
- Potassium as potassium oxide (K2O) \$100,000
- Ag Lime as calcium carbonate (CaCO3) \$65,000

Only nutrients for which there is a net-crop need should be included in monetary valuation, on a field-by-field basis. Applications are Nitrogen-based, so the Nitrogen value should be included in its entirety. Liming of fields is typically necessary under normal farming operations, so the Ag Lime value should also be included in its entirety.

Quality Assurance/Quality Control

- Class B Biosolids (Pathogen Reduction 40 CFR 503.32) -- Biosolids may be land applied with stipulated restrictions and setbacks as defined in the regulations (40 CFR Part 503.14).
- Vector Attraction Reduction - Addition of Alkali (40 CFR 503.33(b)(6)) -- Biosolids are stabilized by the addition of lime kiln dust and raising the pH to greater than 12.0 for two (2) hours and retaining pH at or above 11.5 for an additional 22 hours as required by regulation.

Monitoring Requirements

- Minimum Monitoring Requirements (40 CFR Part 503.16, Table 1) -- For a plant generating greater than or equal to 15,000 metric tons per year, the required minimum monitoring frequency is once per month.
- City Monitoring Practices:

Total Solids, pH (grab samples)	Daily
Nutrients (N, P and K); Other Nutrients (Ca, Fe, B, and S)	Once/Week
Regulated Metals; Fecal Coliform; and Total Solids (composite sample)	
Pathogens for Class A and Class B biosolids	Once/Month
Pathogens (Dewatering Feed Solids)	Once/Quarter
PCB and TCLP	Once/Year

Production Methods

- Wastewater Treatment Process:

The Moccasin Bend WWTP has a treatment capacity of 140 million gallons per day (MGD). The plant operates the following liquid treatment unit processes:

 1. Screening sand grit removal;
 2. Primary settling and scum removal;
 3. High purity oxygen activated sludge biological treatment;
 4. Final clarification;
 5. Chlorine disinfection;
 6. Sodium bisulfite dechlorination; and
 7. CSO/wet-weather treatment with a capacity of 80 MGD includes screenings and grit removal, polymer-aided primary treatment and chlorine disinfection.
- Biosolids Treatment Process:

The Moccasin Bend WWTP has dewatering capacity of 120 dry tons per day. If solids inventory require, dewatering processes can be ramped up to a capacity of 160 dry tons per day. The plant currently operates the following solids treatment unit processes:

 1. Gravity thickening of primary and waste-activated solids;
 2. Thermophilic/mesophilic anaerobic digestion of primary solids;
 3. Waste-activated solids are blended with digested primary solids;
 4. Chemical conditioning of blended solids with polymer followed by dewatering via two (2) 60 dry ton per day high "G" centrifuges or two (2) 50 dry ton per day low "G" centrifuges;
 5. Dewatered solids from the centrifuges are lime stabilized with lime kiln dust to produce Class B biosolids;
 6. A second dewatering process available consists of chemical conditioning of blended solids with lime slurry and ferric chloride followed by hot water vacuum filter presses capable of processing approximately 43 dry tons per day;
 7. The biosolids produced from these processes are combined and land applied on agricultural sites.

Other Considerations

Environmental and Conserved Natural Resources Value

- 488 tons of Nitrogen were recycled, rather than going to landfill.
- 19,900 mmBTU (million BTU) of natural gas was conserved, since farmers didn't need to purchase manufactured chemical fertilizer.
- That's 19,900,000 cubic feet of natural gas.
- If used to generate power, that natural gas could make 5,820,000 kW-hrs of electricity.
- That could run 354 typical 1875W hair dryers for a year.
- 1,200 tons of CO2 didn't end up in the atmosphere.